Software Engineering: Requirements Analysis

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# Source Requirements

A list of the source requirements using the holistic method,

**Passenger Management**

Registration: Adding new passengers, Profile Management: Edit and update passenger details.

**Flight Information Management**

Flight Details Capture: Input and store flight details, Schedule Management: Update and manage flight schedules.

**Passenger-Flight Association**

Booking Management: Associate passengers with flights, Travel History: Track passengers' travel history.

**Staff Allocation**

Staff Records: Maintain staff records, Flight Assignments: Allocate staff to flights.

**Airplane Assignment**

Aircraft Database: Maintain airplane details, Flight Linkage: Assign airplanes to flights.

**Intermediate Stops Management**

Stop Information: Manage information about intermediate stops.

**User Interface**

Passenger Registration: Intuitive registration interface, Flight Booking: User-friendly booking interface.

**Search Functionality**

Passenger Search: Search tools for finding passengers, Flight Search: Search flights by various parameters.

**Basic Reporting**

Passenger Manifests: Generate passenger manifests, Flight Schedules: Create and distribute flight schedules.

**Data Security:**

Encryption: Implement encryption for sensitive data, Access Control: Role-based access control.

**System Performance**

Load Handling, Response Time: Maintain fast response times.

**User-Friendly Interfaces**

Intuitive Design: Easy to navigate interfaces, Training Materials: Provide user guides.

**Regulatory Compliance**

Aviation Standards: Comply with industry regulations, Data Protection: Adhere to data protection regulations.

**Scalability**

Modular Design: Easily scalable system.

**Documentation**

Technical Documentation: Provide technical documentation, User Documentation: Create user manuals.

# Requirements Analysis

| Requirements | Comments |
| --- | --- |
| Passenger Management | Must-Have functionalities for adding, updating, and validating passenger details. |
| Flight Information Management | Must-Have functionalities for capturing, updating, and maintaining flight details. |
| Passenger-Flight Association | Must-Have functionalities for booking management, travel history, and real-time updates. |
| Staff Allocation | Must-Have functionalities for maintaining staff records, flight assignments, and qualification tracking. |
| Airplane Assignment | Must-Have functionalities for managing airplane database and flight links. |
| Intermediate Stops Management | Must-Have functionalities for managing intermediate stop details and itineraries. |
| User Interface | Should-Have functionalities for intuitive passenger registration, booking, and centralized dashboard. |
| Search Functionality | Should-Have functionalities for efficient passenger and flight searches. |
| Basic Reporting | Should-Have functionalities for generating reports like passenger manifests and flight schedules. |
| Advanced Search and Filtering | Could-Have functionalities for enhanced search capabilities with multiple filtering options. |
| External System Integration | Could-Have functionalities for API integration and data import/export. |
| Real-Time Updates | Could-Have functionalities for live flight status and notification systems. |

**Context**

* The system will be used by airline staff to manage passengers, flights, staff, and airplanes.
* Integration with external systems (like travel agencies and GDS) is desired but not critical in the initial phase.
* Real-time updates and notifications are important for operational efficiency and customer satisfaction.

**Operational Requirement**

* Ensure high availability and fast response times.
* Handle peak loads, especially during high traffic periods like holidays and sales events.
* Provide role-based access control to secure sensitive data.

**Non-functional System Requirements**

* **Data Security:** Implement encryption, role-based access control, and maintain audit logs.
* **System Performance:** Ensure the system can handle peak loads, maintain fast response times, and ensure high availability.
* **User-Friendly Interfaces:** Design intuitive interfaces and provide comprehensive training materials.
* **Regulatory Compliance:** Comply with aviation industry regulations and data protection laws.

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| **Non-functional Implementation Requirement** | **Functional Requirement** | **Non-functional Performance Requirement** |
| Encryption for sensitive data | Passenger Management functionalities | System must handle peak loads during busy periods |
| Role-based access control for data security | Flight Information Management functionalities | System must maintain fast response times |
| Audit logs for all system activities | Passenger-Flight Association functionalities | System must ensure high availability |
| Intuitive design for user interfaces | Staff Allocation functionalities |  |
| Compliance with aviation standards and GDPR/CCPA | Airplane Assignment functionalities |  |
|  | Intermediate Stops Management functionalities |  |
|  | User Interface functionalities |  |
|  | Search Functionality functionalities |  |
|  | Basic Reporting functionalities |  |
|  | Advanced Search and Filtering functionalities (Could-Have) |  |
|  | External System Integration functionalities (Could-Have) |  |
|  | Real-Time Updates functionalities (Could-Have) |  |

# MoSCoW Analysis

## Functional Requirements

### Must-Have:

#### Passenger Management:

* Registration: Functionality for adding new passengers with input forms.
* Profile Management: Edit and update passenger details such as surname, name, address, and phone.
* Data Validation: Ensure accurate and complete data entry with validation rules.

#### Flight Information Management:

* Flight Details Capture: Input and store flight details including flight number, origin, destination, date, arrival time, and departure time.
* Schedule Management: Ability to update and manage flight schedules, including delays and cancellations.
* Data Integrity: Maintain consistency and accuracy of flight information.

#### Passenger-Flight Association:

* Booking Management: Enable passengers to be associated with flights, creating booking records.
* Travel History: Track and display passengers' travel history and preferences.
* Dynamic Updates: Reflect changes in bookings and cancellations in real-time.

#### Staff Allocation:

* Staff Records: Maintain detailed records of staff members including employee number, surname, name, address, phone, and salary.
* Flight Assignments: Allocate staff to flights, with support for multiple assignments per staff member.
* Qualification Tracking: Record and manage pilot type ratings and qualifications for flying specific aircraft types.

#### Airplane Assignment:

* Aircraft Database: Maintain a database of airplanes with details such as serial number, manufacturer, and model.
* Flight Linkage: Assign specific airplanes to flights, ensuring accurate tracking of aircraft usage.
* Maintenance Records: Optionally track maintenance schedules and history for each airplane.

#### Intermediate Stops Management:

* Stop Information: Input and manage information about intermediate stops or cities for flights.
* Flight Itinerary: Define and update flight itineraries with multiple stops.
* Order Management: Specify the order of stops for multi-stop flights.

### Should-Have:

#### User Interface:

* Passenger Registration: Intuitive interface for easy passenger registration and profile management.
* Flight Booking: User-friendly booking interface for selecting and booking flights.
* Dashboard: Centralized dashboard for airline staff to view and manage operations.

#### Search Functionality:

* Passenger Search: Efficient search tools for finding passengers by various criteria.
* Flight Search: Ability to search flights by flight number, origin, destination, date, and other parameters.

#### Basic Reporting:

* Passenger Manifests: Generate and print passenger manifests for flights.
* Flight Schedules: Create and distribute flight schedules, including updates and changes.
* Staff Reports: Basic reports on staff assignments and availability.

### Could-Have:

#### Advanced Search and Filtering:

* Advanced Filters: Enhanced search capabilities with multiple filtering options (e.g., by date range, destination, passenger preferences).
* Custom Queries: Ability to create and save custom search queries for frequent use.

#### External System Integration:

* API Integration: Integrate with external systems such as travel agencies, partner airlines, and global distribution systems (GDS).
* Data Import/Export: Import and export data from/to external systems for synchronization.

#### Real-Time Updates:

* Live Flight Status: Provide real-time updates on flight status (e.g., on-time, delayed, cancelled).
* Notification System: Notify passengers and staff of schedule changes via email/SMS.

### Won't-Have (this time):

#### Advanced Analytics:

* Flight Optimization: Tools for analyzing and optimizing flight schedules and routes.
* Predictive Analytics: Predictive models for demand forecasting and operational efficiency.

#### Mobile Application:

* Passenger App: Mobile application for passengers to manage bookings, check-in, and receive updates.
* Staff App: Mobile application for staff to manage assignments and receive notifications.

#### Legacy System Integration:

* Complex Integrations: Integration with older legacy systems not critical for initial implementation**.**

## Non-Functional Requirements

### Must-Have:

#### Data Security:

* Encryption: Implement encryption for sensitive data, both in transit and at rest.
* Access Control: Role-based access control to restrict data access based on user roles.
* Audit Logs: Maintain logs of all system activities for auditing purposes.

#### System Performance:

* Load Handling: Ensure the system can handle peak loads, particularly during busy booking periods.
* Response Time: Maintain fast response times for user interactions.
* Uptime: Ensure high system availability with minimal downtime.

#### User-Friendly Interfaces:

* Intuitive Design: Design interfaces that are easy to navigate and use for airline staff.
* Training Materials: Provide comprehensive training materials and user guides.

#### Regulatory Compliance:

* Aviation Standards: Comply with aviation industry regulations and standards (e.g., IATA, FAA).
* Data Protection: Adhere to data protection regulations (e.g., GDPR, CCPA).

### Should-Have:

#### Scalability:

* Modular Design: Design the system to be easily scalable to accommodate future growth.
* Cloud Compatibility: Ensure compatibility with cloud infrastructure for scalable deployment.

#### Documentation:

* Technical Documentation: Provide detailed technical documentation for system maintenance and future development.
* User Documentation: Create user manuals and guides for airline staff.

#### Training and Support:

* Staff Training: Offer training sessions for airline staff to familiarize them with the system.
* Help Desk: Provide ongoing support and a help desk for troubleshooting and assistance.

### Could-Have:

#### Enhanced Performance:

* Optimization Techniques: Implement advanced optimization techniques for database queries and application performance.
* Caching: Utilize caching mechanisms to improve response times for frequently accessed data.

#### Additional Security Features:

* Two-Factor Authentication: Implement two-factor authentication for added security.
* Intrusion Detection: Set up intrusion detection systems to monitor and alert on suspicious activities.

#### Continuous Monitoring:

* Performance Monitoring: Continuously monitor system performance and health.
* Automated Alerts: Set up automated alerts for any performance issues or system failures.

### Won't-Have (this time):

#### Third-Party Integration:

* Extensive Integrations: Avoid extensive third-party integrations beyond basic functionality for the initial release.

#### Advanced Compliance Certifications:

* Beyond Standards: Focus on meeting industry standards without pursuing advanced certifications initially.

#### Non-Critical Enhancements:

* Additional Enhancements: Defer non-critical enhancements and features for future phases to ensure timely delivery.

# Object-Oriented Analysis (OOA)

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# Function Flow Diagrams

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A diagram of a plane

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# Context Diagram

A diagram of a flight management system

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# Standard Process Models

The following models display the Passenger management, staff allocation, flight scheduling and management and airplane assignment process’.

A diagram of a passenger management system

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This model shows the process of inputting passenger details.

A diagram of a flight

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This model shows the process of inputting plane journey stop details for a flight.

A diagram of a process

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# Check List

| **Requirement** | **Clear and Unambiguous** | **Complete** | **Consistent** | **Feasible** | **Verifiable** | **Traceable** | **Prioritized** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Passenger Management** |  |  |  |  |  |  |  |
| Registration | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Profile Management | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Data Validation | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| **Flight Information Management** |  |  |  |  |  |  |  |
| Flight Details Capture | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Schedule Management | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Data Integrity | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| **Passenger-Flight Association** |  |  |  |  |  |  |  |
| Booking Management | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Travel History | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Dynamic Updates | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| **Staff Allocation** |  |  |  |  |  |  |  |
| Staff Records | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Flight Assignments | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Qualification Tracking | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| **Airplane Assignment** |  |  |  |  |  |  |  |
| Aircraft Database | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Flight Linkage | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Maintenance Records | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Should-Have |
| **Intermediate Stops Management** |  |  |  |  |  |  |  |
| Stop Information | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Flight Itinerary | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Must-Have |
| Real-Time Updates | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | Should-Have |